

REMARKS

Applicants thank the Examiner for carefully considering the subject application.

Regarding the drawing, the Examiner has objected to the drawings as failing to include a reference sign for controller 12. However, Applicants respectfully submit that the controller 12 is clearly designated in Figure 1 with the reference sign "12" on the upper right hand side. Regarding Figure 3, a Replacement sheet is included herewith labeling Figure 3 as showing performance of the "Prior Art."

Regarding the objection to Claim 8 as a duplicate of claim 6, Applicants respectfully submit that Claim 8 is more restrictive than claim 6, in that it requires an air gap "immediately" adjacent to a permanent magnet, where no such restriction is included in claim 6. As such, Applicants submit that it is proper to include both claims 6 and 8.

Regarding claim 22, it has been rewritten in independent form and therefore should be allowed, along with claim 23 which depends therefrom.

Regarding Inoue et al. (US 4,152,570), Applicants respectfully submit that it is simply inapplicable to the pending claims. Inoue et al. relates to a "tool electrode for the electrical machining of a workpiece." See the abstract. Further, the skilled person would see the electromagnet of Inoue et al. as unacceptable for valve actuation of internal combustion engines for numerous reasons. As one example, Inoue et al. places the permanent magnet (PM) on the moving part, i.e. the armature. If one applied such a system to engine valve actuation according to the prior art, it would provide degraded results since the added mass of the armature would severely restrict the ability to rapidly open and close the valve during engine operation. As such, Applicants respectfully submit that the pending claims patentably distinguish Inoue et al.

As Inoue et al. formed the sole basis of rejecting the features of claims 11, 17 and 21, Applicants respectfully submit that these claims, and claims dependent thereon should be allowed.

Regarding Guerin et al. (EP 1174595), Applicants have amended claim 1 to more particularly point out the claimed features. Specifically, claim 1 specifies the orientation of the coil windings relative to armature movement. As shown in the specification (e.g., Figure 2), the coil is wound about the core in such a way that the axis of the coil is parallel to the movement of the armature (up and down in the case of Figure 2), as reproduced below. This is in sharp contrast to the approach of Guerin et al. As shown in Figure 3 (also reproduced below), the axis of the coil windings is perpendicular to the movement of the armature.

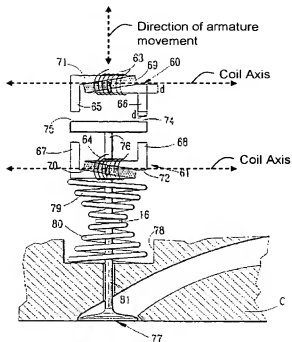


FIG.3 Guerin et al.

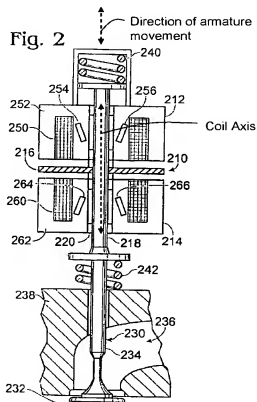


Figure 3 of Guerin et al. and Figure 2 of the present application (with annotations added in RED).

The approach of Guerin et al. creates several disadvantages. For example, because of the magnet location and orientation, the pole width has to be decreased as the magnet width increases for a given total electromagnet width. However, since the magnetic force is proportional to the pole width and the magnet width, the approach of Guerin et al. results in a tradeoff between pole width and magnet width. Therefore, Applicants respectfully submit that the drawbacks of Guerin et al. highlight the novel and non-obvious approach of claim 1. This also applies to claim 24.

Based on the foregoing comments, the above-identified application is believed to be in condition for allowance, and such allowance is courteously solicited. If any further amendment is necessary to advance prosecution and place this case in allowable condition, the Examiner is courteously requested to contact the undersigned by fax or telephone at the number listed below.

Please charge any cost incurred in the filing of this Amendment, along with any other costs, to Deposit Account No. 06-1510. If there are insufficient funds in this account, please charge the fees to Deposit Account No. 06-1505. A duplicate copy of this sheet is enclosed.

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Mail Stop AMENDMENT, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450, on February 7, 2005.


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